

Attorney's Docket No.: 02240.P015D

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Patent Application of:

Gary S. Chisholm et al.

Application No: 09/049,161

Filed: March 26, 1998

For: METHOD AND APPARATUS FOR PRECISE
POSITIONING OF LARGE STRUCTURES



Examiner: Hernandez, O.

Art Unit: 3661

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APPEAL BRIEF
IN SUPPORT OF APPELLANTS' APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

701/50

This Brief is submitted in triplicate in support of this appeal from a final decision of the Examiner, mailed November 17, 2000. Consideration of this appeal by the Board of Patent Appeals and Interferences for allowance of the above-captioned patent application is respectfully requested.

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I. REAL PARTY IN INTEREST

The real party in interest is Trimble Navigation, Ltd., a corporation of California having a place of business at 645 North Mary Avenue, Sunnyvale, CA.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 11-20 are currently pending. Claims 11 - 14 have been finally rejected and claims 15 - 20 have been objected to as being dependent upon a rejected base claim but are otherwise allowable.

IV. STATUS OF AMENDMENTS

There are no currently pending amendments.

V. SUMMARY

A. Summary of the Invention

The present invention concerns a system for precisely positioning a three dimensional structure at a desired location. The system utilizes a global positioning system (GPS) receiver to provide positioning information regarding the structure and provides a unique set of display information to a user, which includes a visual, graphical representation of both the present and desired positions, orientations and attitudes of the structure being positioned. Through the use of this display information, a user is able to move the structure into the desired position.

Many construction tasks involve locating large, three-dimensional structures (e.g., bridge sections and the like). Traditional methods of monitoring the placement of such structures involve the use of a

variety of surveying techniques. These may include using visible lasers and/or optical theodolites. Such methods are not particularly convent, however, because they require trained personal to visit the construction site each time a new section of the structure is being moved into position.

The present invention helps to alleviate this situation by introducing several novel features. To begin, a virtual model of the structure of interest is created and stored in a computer memory. Some time later, remote sensors are placed in selected positions on the actual structure of interest. The sensors are configured so as to provide real time location, attitude and orientation information regarding the structure and may consist of GPS remote units, tilt meters, gyro compasses, and pressure sensors. The position of each remote sensor on the actual structure is also recorded in the computer memory so that the virtual model of the structure accurately reflects the real world situation.

As the structure is being positioned, real time location, attitude and orientation information produced by the remote sensors is monitored at a base station and used to update the virtual model with respect to a predefined coordinate system. In this way, the virtual model accurately reflects the current location, attitude and orientation of the structure. The information so obtained can be displayed to a user as a graphical and textual representation of the current state of the structure. In addition, the desired location, attitude and orientation of the structure is displayed. Such a display is then used by an operator to adjust the current location, attitude and orientation of the structure so as to align the current position of the structure with the desired position. In this way, this structure can be precisely positioned.

Claim 11 is presented below with elements read on Figures of the drawings as required in MPEP 1206.

11. A precise positioning apparatus (200) comprising:
 - a system bus (206);
 - a GPS receiver (102) configured to communicate with the system bus (206) , the GPS receiver (102) generating position information regarding the position of a structure (100) associated with the GPS receiver;

a memory (208) configured to communicate with the system bus (206);

a display (212) configured to communicate with the system bus (206);

a microprocessor (202) configured to communicate with the system bus (206), the microprocessor (202) configured to receive (508) the position information from the GPS receiver (102) and configured to generate display information based on the position information, the display information comprising guidance and orientation information, the microprocessor (202) configured to transmit the display information to the display (212),

wherein the display information is displayed (512) on the display (212) such that a user is provided with a visual graphical representation of the present position (640), orientation (602) and attitude (604) of the structure and the desired position (642), orientation (642) and attitude (606) of the structure.

As stated in MPEP 1206, the claims are not to be limited to this embodiment by such reading.

B. Summary of Rejections

Claims 11 and 12 were rejected under 35 USC 102(e) as being anticipated by Morimoto et al, US Patent No. 5,821,880 ("Morimoto"). [Final Office Action of, p. 3.]

Claims 13 and 14 were rejected under 35 U.S.C. 103 as being unpatentable over Morimoto. [Final Office Action, p. 4.]

Claims 13 and 14 were also rejected under 35 U.S.C. 103 as being unpatentable over Ito et al., US Patent No. 5,729,217 ("Ito"). [Final Office Action, p. 4.]

C. Summary of the References

Morimoto describes an automobile navigation system wherein it appears that the displayed information includes the desired position and, perhaps, the desired orientation (e.g., North, South, etc.) of the vehicle.

Ito describes an automobile navigation system wherein it appears that the displayed information includes the desired position and, perhaps, the desired orientation (e.g., North, South, etc.) of the vehicle.

VI. ISSUES

1. Whether claims 11 and 12 are patentable over Morimoto?
2. Whether claims 13 and 14 are patentable over Morimoto?
3. Whether the claims are patentable over Ito?

VII. GROUPING OF CLAIMS

For the purposes of this appeal, claims 11 and 12 stand or fall together but are separately patentable from claims 13 and 14 and claims 15 - 20. Claims 15 - 20 have already been found allowable and claims 13 and 14 recite subject matter which the Office Action has admitted is not taught by either of the cited references (and hence the rejections were made under 35 USC 103).

Claims 13 and 14 stand or fall together but are separately patentable from claims 15 - 20, which have already been found to be allowable.

VIII. ARGUMENT

A. Claims 11 and 12 are Patentable over Morimoto

Morimoto et al., U.S. Patent 5,821,880 fails to teach or suggest elements of the claimed precise positioning apparatus and, therefore, the claims are patentable over this reference. For example, Morimoto does not teach or suggest display information that includes a present and desired position, orientation and **attitude** of a structure. With reference to Figures 2 - 4 of Morimoto (which appear to be

identical to Figures 2, 3 and 4 of Ito), it appears that the displayed information includes the desired position and, perhaps, the desired orientation (e.g., North, South, etc.) of the vehicle. However, nowhere do these figures or their accompanying descriptions indicate that the desired attitude of the vehicle is also displayed.

“Attitude” is unlike position or orientation. Position may be regarded as the location of the vehicle and orientation as the heading of the vehicle. However, “attitude” is a description of a vehicle’s or a structure’s alignment in three-dimensional (or other dimensional) space, with respect to a given plane or other reference. See, e.g., Webster’s New World Dictionary. Nowhere does Morimoto indicate that such information is displayed.

The Office Action offers the unsupported suggestion that if a car which includes Morimoto’s navigation system is traveling up a mountain, attitude information will be displayed because the car is moving in the “y” axis. This statement finds no support whatsoever in Morimoto’s disclosure. Nothing in the reference indicates that “y” axis information is provided as part of the visual display to the user.

In contrast, the display of a structure’s present and desired **attitude** is a recited element of the claimed apparatus. An example of such display information is shown in Figure 6 (though other display types are possible). For the Office Action to use the teachings provided by the present application and indicate that perhaps Morimoto’s system “can” perhaps be altered to do similar things is an impermissible use of hindsight and cannot properly be used to reject the present claims. Consequently, because the present claims include elements neither taught nor suggested by the references the claims are patentable over Morimoto.

B. Claims 13 and 14 are Patentable over Morimoto

Claims 13 and 14 depend from claim 11 and are patentable over Morimoto for at least the same reasons as claim 11. Moreover, the Office Action has cited no reference or other teaching which discloses the features of the rejected claims. More than a mere communication system is recited in claims 13 and 14. Instead, particular communication systems that provide links to a microprocessor are recited.

Without providing any reference to support the allegations of unpatentability set forth in the Office Action, the rejections must be removed.

C. The Claims are Patentable over Ito

There is no direct statement in the Office Action that indicates claims 11 and 12 are being rejected in light of Ito. Nevertheless, other statements in the Office Action may be read as such an indication. Regardless of this informality, however, it remains true that Ito fails to teach or suggest elements of the claimed precise positioning apparatus and, therefore, the claims are patentable over this reference. For example, Ito does not teach or suggest display information that includes a present and desired position, orientation and attitude of a structure. With reference to Figures 2, 3 and 4 of Ito (which appear to be identical to Figures 2 – 4 of Morimoto), it appears that the displayed information includes the desired position and, perhaps, the desired orientation (e.g., North, South, etc.) of the vehicle. However, nowhere do these figures or their accompanying descriptions indicate that the desired attitude of the vehicle is also displayed. As indicated above “attitude” is unlike position or orientation. Position may be regarded as the location of the vehicle and orientation as the heading of the vehicle. However, “attitude” is a description of a vehicle’s or a structure’s alignment in three-dimensional (or other dimensional) space, with respect to a given plane or other reference. Nowhere do the cited references indicate that such information is displayed. Consequently, the claims are patentable over Ito for the same reason as they are patentable over Morimoto.

Claims 13 and 14 depend from claim 11 and are patentable over Ito for at least the same reasons as claim 11. Moreover, the Office Action has cited no reference or other teaching which discloses the features of the rejected claims. More than a mere communication system is recited in claims 13 and 14. Instead, particular communication systems that provide links to a microprocessor are recited. Without providing any reference to support the allegations of unpatentability set forth in the Office Action, the rejections must be removed.

IX. CONCLUSION


For the foregoing reasons, Appellants respectfully request reversal of the Examiner's rejections as set forth in the Final Office Action and request that the Board direct allowance of all of the claims. If there are any additional charges, please charge Deposit Account No. 02-2666.

Respectfully submitted,

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APPENDIX A
(37 C.F.R. § 1.192 (c)(9))

The claims on appeal read as follows:

1 11. A precise positioning apparatus comprising:
2 a system bus;
3 a GPS receiver configured to communicate with the system bus, the GPS receiver
4 generating position information regarding the position of a structure associated with the GPS
5 receiver;
6 a memory configured to communicate with the system bus;
7 a display configured to communicate with the system bus;
8 a microprocessor configured to communicate with the system bus, the
9 microprocessor configured to receive the position information from the GPS receiver and
10 configured to generate display information based on the position information, the display
11 information comprising guidance and orientation information, the microprocessor configured to
12 transmit the display information to the display,

13 wherein the display information is displayed on the display such that a user is provided
14 with a visual graphical representation of the present position, orientation and attitude of the
15 structure and the desired position, orientation and attitude of the structure.

1 12. A precise positioning apparatus as in claim 11 further comprising a communication
2 system, the communication system coupled to the GPS receiver and to the system bus, the
3 communication system providing a link for communicating information from the GPS receiver to
4 the microprocessor.

1 13. A precise positioning system as in claim 12 wherein the communication system

2 comprises a two-way radio communication system.

1 14. A communication system as in claim 12 wherein the communication system comprises
2 an optical communication system.

1 15. A precise positioning system as in claim 12 further comprising an orientation sensor,
2 the orientation sensor generating orientation information regarding the orientation of the structure,
3 the orientation sensor coupled to the communication system, wherein the communication system
4 further providing a link for communicating orientation information from the orientation sensor to
5 the microprocessor.

1 16. A precise positioning system as in claim 15 wherein the orientation sensor comprises a
2 gyro compass.

1 17. A precise positioning system as in claim 12 further comprising an attitude sensor, the
2 attitude sensor generating pitch information regarding the structure, the attitude sensor coupled to
3 the communication system, wherein the communication system further providing a link for
4 communicating the pitch information from the orientation sensor to the microprocessor.

1 18. A precise positioning system as in claim 17 wherein the attitude sensor further
2 generating roll information regarding the structure, and wherein the communication system further
3 providing a link for communicating the roll information to the microprocessor.

1 19. A precise positioning system as in claim 18 wherein the attitude sensor comprises a tilt
2 meter.

1 20. A precise positioning system as in claim 12 further comprising a pressure sensor, the
2 pressure sensor generating depth information regarding the structure, the pressure sensor coupled to
3 the communication system, wherein the communication system further providing a link for

- 4 communicating the depth information from the pressure sensor to the microprocessor.



AF #3661

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(inventor(s))

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(title)

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JAN 15 2001

SIR: Transmitted herewith is a Response for the above application.

 Small entity status of this application under 37 C.F.R. §§ 1.9 and 1.27 has been established by a verified statement previously submitted.

 A verified statement to establish small entity status under 37 C.F.R. §§ 1.9 and 1.27 is enclosed.

 No additional fee is required.

 X A check in the amount of \$ 310.00 is attached for presentation of the Appeal Brief.

 Applicant(s) hereby Petition(s) for an Extension of Time of month(s) pursuant to 37 C.F.R. § 1.136(a).

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